## Bonneville Power Administration
## Fish and Wildlife Program FY99 Proposal

## Section 1. General administrative information

# Shoshone-Bannock/Shoshone-Paiute Joint Culture Facility

**Bonneville project number, if an ongoing project** 9500600

**Business name of agency, institution or organization requesting funding**
Shoshone-Bannock Tribes

**Business acronym (if appropriate)** SBT

**Proposal contact person or principal investigator:**


**Name** David C. Moser
**Mailing Address** P.O. Box 306
**City, ST Zip** Fort Hall, ID, 83203
**Phone** (208) 238-3761
**Fax** (208) 238-3742
**Email address** salmon@nicoh.com


**Subcontractors.**

| Organization | Mailing Address | City, ST Zip | Contact Name |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

**NPPC Program Measure Number(s) which this project addresses.**
10.3E.9, 10.8C.6, 10.3E.11, 10.8C.7, 10.3E.10

**NMFS Biological Opinion Number(s) which this project addresses.**

**Other planning document references.**

**Subbasin.**
Upper Snake River

**Short description.**
Planning, development, and operation of a hatchery facility to provide native trout for supplementation of stocks affected by hybridization, habitat loss, and exploitation on the Duck Valley and Fort Hall Reservations

## Section 2. Key words

| Mark | Programmatic Categories | Mark | Activities | Mark | Project Types |
|---|---|---|---|---|---|
| | Anadromous fish | | Construction | | Watershed |
| X | Resident fish | + | O & M | + | Biodiversity/genetics |
| | Wildlife | X | Production | | Population dynamics |
| | Oceans/estuaries | + | Research | | Ecosystems |
| | Climate | + | Monitoring/eval. | | Flow/survival |
| | Other | | Resource mgmt | | Fish disease |
| | | | Planning/admin. | X | Supplementation |
| | | | Enforcement | | Wildlife habitat en- |
| | | | Acquisitions | | hancement/restoration |

**Other keywords**.
Yellowstone cutthroat trout, redband trout,

## Section 3. Relationships to other Bonneville projects

| Project # | Project title/description | Nature of relationship |
|---|---|---|
| 9201000 | Habitat restoration/enhancement Fort Hall Reservation | Provides conditions to re-establish native Yellowstone cutthroat trout runs in bottoms and mountain stream tributaries |
| | | |

## Section 4. Objectives, tasks and schedules

### *Objectives and tasks*

| Obj 1,2,3 | Objective | Task a,b,c | Task |
|---|---|---|---|
| 1 | Operation of hatchery | a | Production of hatchery rainbows for release in enclosed reservoirs |
| | | b | Experimentation with holding of native broodstock in a hatchery setting |

| | | | |
|---|---|---|---|
| | | c | Production of Yellowstone cutthroat and redband trout for release in target streams |
| | | | |

### *Objective schedules and costs*

| Objective # | Start Date mm/yyyy | End Date mm/yyyy | Cost % |
|---|---|---|---|
| 1 | 10/1998 | 10/2024 | 100.00% |
| | | | |
| | | | |
| | | | |
| | | | TOTAL 100.00% |

**Schedule constraints.**
Operation of the hatchery is dependant upon purchase of property, engineering/design, and construction. All phases of the three step NPPC review process have been completed.

**Completion date.**
2024

## Section 5. Budget

### *FY99 budget by line item*

| Item | Note | FY99 |
|---|---|---|
| Personnel | Three full time two part time personnel | $114,564 |
| Fringe benefits | | $38,952 |
| Supplies, materials, non-expendable property | Additional funds needed for hatchery startup | $61,000 |
| Operations & maintenance | Feed, Power, Oxygen | $61,000 |
| Capital acquisitions or improvements (e.g. land, buildings, major equip.) | | $0 |
| PIT tags | # of tags: | $0 |
| Travel | | $0 |
| Indirect costs | | 43,645 |
| Subcontracts | | $0 |
| Other | | $0 |
| **TOTAL** | | $319,161 |

***Outyear costs***

| Outyear costs | FY2000 | FY01 | FY02 | FY03 |
|---|---|---|---|---|
| Total budget | $302,000 | $302,000 | $302,000 | $302,000 |
| O&M as % of total | 26.00% | 26.00% | 26.00% | 26.00% |

## Section 6. Abstract

Streams on the Fort Hall Reservation have suffered from years of livestock grazing and rapid flooding and drafting of American Falls Reservoir. In addition to physical habitat damage, fish stocks have been negatively affected through genetic introgression, competition with non-native salmonids, and exploitation. An effort to restore Reservation streams and riparian areas was begun in 1992 (Habitat restoration /enhancement Fort Hall Reservation; #9201000) and has been succesful in stabilizing banks, reducing sediment loads, deepening stream channels, and increasing fish numbers. The restoration project addresses one limiting factor in the recovery of native Yellowstone cutthroat (*Oncorhynchus clarki bouvieri*), specifically physical habitat conditions to maintain a self-perpetuating fishery. This project was initiated to address problems stemming from hybridization with hatchery rainbow trout *(Oncorhynchus mykiss)* and competition with non-native brook trout (*Salvelinus fontinalis),* brown trout (*Salmo trutta*), and hatchery rainbow trout (*Oncorhynchus mykiss*). The goal of the joint culture facility is to produce native Yellowstone cutthroat trout, redband trout, and rainbow trout. Rainbow trout will be produced for put-and-take fisheries in enclosed reservoirs to provide recreational and subsistence opportunities and ease pressure on native fish stocks. Native fish will be used to re-establish stocks diminishing due to habitat loss, hybridization with non-native species, and exploitation. Prior to selection of broodstock a genetic inventory of Yellowstone cutthroat will be completed on the Fort Hall Reservation. Native broodstock will be replaced with wild gametes at a rate of 20-30% every year to prevent loss of genetic variation. The majority of native trout supplementation will involve outplanting eyed or green eggs to hatchboxes. Adult cutthroat and redband brood stock will be spawned in the hatchery to provide eggs, fingerlings, and catchable trout for Duck Valley and Fort Hall Reservations. Cutthroat brood stock (160) pairs will be spawned to provide 350,000 eggs for the Fort Hall Reservation and 8,000 catchables. Redband (150 - 300 pairs) will be spawned to provide Duck Valley Reservation with 350,000 eggs, 245,000 fingerlings and 94,000 catchables. Also rainbow trout eggs will be purchased to provide 550,000 rainbow fingerlings and 164,000 catchable rainbows for stocking in enclosed reservoirs.

## Section 7. Project description

**a. Technical and/or scientific background**.

The distribution and abundance of Yellowstone cutthroat trout have declined in the Snake River Plain of Idaho through habitat degradation, genetic introgression, and exploitation (Thurow et al. 1988). The use of supplementation in conjunction with habitat improvement and other measures has been shown to be successful in re-introducing the greenback cutthroat trout in Colorado (Stuber et al. 1988; Dwyer and Rosenlund 1988) This project addresses the resident fish goals in section 10 in the Columbia River Fish and Wildlife Program (1994), specifically the long-term sustainability of native fish in native habitats. Restoration of reservation streams is a first step in providing the conditions for sustainable populations of native Yellowstone cutthroat trout. The second step involves supplementation/re-introduction of un-hybridized Yellowstone cutthroat trout. Streams on the Fort Hall Reservation have suffered from years of livestock grazing and rapid flooding and drafting of American Falls Reservoir. In addition to physical habitat damage, fish stocks have been negatively affected through genetic introgression, competition with non-native salmonids, and exploitation. An effort to restore Reservation streams and riparian areas was begun in 1992 (Habitat restoration /enhancement Fort Hall Reservation; #9201000) and has been succesfull in stabilizing banks, reducing sediment loads, deepening stream channels, and increasing fish numbers. The restoration project addresses one limiting factor in the recovery of native Yellowstone cutthroat (*Oncorhynchus clarki bouvieri*), specifically physical habitat conditions to maintain a self-perpetuating fishery. This project was initiated to address problems stemming from hybridization with hatchery rainbow trout *(Oncorhynchus mykiss)* and competition with non-native brook trout (*Salvelinus fontinalis).* The goal of the joint culture facility is to produce native Yellowstone cutthroat trout, redband trout, and rainbow trout. Rainbow trout will be produced for put-and-take fisheries in enclosed reservoirs to provide recreational and subsistence opportunities and ease pressure on native fish stocks. Native fish will be used to re-establish stocks diminishing due to habitat loss, hybridization with non-native species, and exploitation. Prior to selection of broodstock a genetic inventory of Yellowstone cutthroat trout will be completed on the Fort Hall Reservation. Funding for the genetic inventory was requested as part of 1999 funding within project #9201000 Habitat restoration/enhancement Fort Hall Reservation. Native broodstock will be replaced with wild gametes at a rate of 20-30% every year to prevent loss of genetic variation. The majority of native trout supplementation will involve outplanting eyed or green eggs to hatchboxes. Production goals include; adult cutthroat and redband brood stock will be spawned in the hatchery to provide eggs, fingerlings, and catchable trout for Duck Valley and Fort Hall Reservations. Cutthroat brood stock (160) pairs will be spawned to provide 350,000 eggs for the Fort Hall Reservation and 8,000 catchables. Redband (150 - 300 pairs) will be spawned to provide Duck Valley Reservation with 350,000 eggs, 245,000 fingerlings and 94,000 catchables. Also rainbow trout eggs will be purchased to provide 550,000 rainbow fingerlings and 164,000 catchable rainbows for the Duck Valley Reservation. Hatchery rainbows will be produced for put-and-take fisheries in enclosed reservoirs/systems. Put-and-take fisheries will ease fishing pressure on native stocks.

Measures for establishing Shoshone-Bannock and Shoshone-Paiute fishery production facilities have been a part of the Council's Program since 1987. The Shoshone-Bannock/Shoshone-Paiute joint culture facility began in 1992 as a feasibility study

($CH^2M$ Hill 1992). In 1996 the Master Plan for the Fort Hall resident fish hatchery was completed (Montgomery-Watson 1996). The master plan included site recommendations and a cost estimate. Since 1996 negotiations have been in progress for purchase of the preferred hatchery site. The preferred site should be purchased in early 1998. An environmental assessment has been written which includes; a cultural survey, endangered species surveys, and wetlands surveys. All remaining permits (e.g. NPDES) would be obtained before construction or operation of the hatchery facility.

**b. Proposal objectives**.

1) Operation of hatchery

Cutthroat brood stock (160) pairs will be spawned to provide 350,000 eggs for the Fort Hall Reservation and 8,000 catchables. Redband (150 - 300 pairs) will be spawned to provide Duck Valley Reservation with 350,000 eggs, 245,000 fingerlings and 94,000 catchables. Brood stock will be replaced with wild fish/gametes at a rate of 20-30% per year. Also rainbow trout eggs will be purchased to provide 550,000 rainbow fingerlings and 164,000 catchable rainbows for release in enclosed reservoirs.

**c. Rationale and significance to Regional Programs**.

This project addresses the principles of the Fish and Wildlife Program (1994) as outlined in section 10.1A. Section 10.1A calls for protection, mitigation and enhancement of resident fish populations affected by construction and operation of dams. Operation of American Falls Reservoir and upstream projects directly negatively affects populations of native Yellowstone cutthroat trout on the Fort Hall Indian Reservation by degrading physical habitat and providing a source pool of non-native hatchery rainbow trout. In addition, this project is directly referenced in the Fish and Wildlife program as measure 10.3E.9; "Acquire or construct a trout production facility for the production of native trout species for stocking on the Fort Hall Indian Reservation and elsewhere." and 10.3E.11 which provides funding for this project. This project is interconnected with measure 10.3E.10 of the Fish and Wildlife Program, which calls restoration/enhancement of Fort Hall Reservation streams. The objective of the restoration project is to provide conditions for self-sustaining populations of native Yellowstone cutthroat trout. Genetic introgression from domesticated non-resident hatchery rainbow trout has all but extirpated pure strains of Yellowstone cutthroat trout on Bottoms streams and will make supplementation a vital part of returning native stocks to historical levels. This project addresses the concerns of section 7 of the CBFWP (1994) through a genetic inventory of Yellowstone cutthroat trout populations on the Fort Hall Reservation. Biodiversity will be maintained through supplementation of Yellowstone cutthroat obtained from captive broodstock collected on the Fort Hall Reservation. Measures will be implemented (i.e. broodstock gametes replaced yearly at a rate of 20-30%, sperm cryopreservation) to insure that supplementation will have no detrimental effects on wild gene pools.

**d. Project history**

September, 1992. – Feasibility study report, joint culture facilities for the resident fish substitution program on Snake River above Hells Canyon in Idaho, $CH^2M$ Hill, Boise, ID.

April, 1996 – The Shoshone-Bannock and Shoshone-Paiute Tribes master plan for the Fort Hall resident fish hatchery, Montgomery-Watson, 671 Riverpark Lane, Suite 200, Boise, ID.

July 12, 1996 – Resolution passed by Shoshone-Bannock Tribes - partnership between Shoshone-Bannock and Shoshone-Paiute tribes to administer, operate, and manage proposed resident fish hatchery facility

March 5, 1997 – A cultural resources survey of three proposed fish hatcheries in southeastern Idaho, Bingham and Power Counties. Emerson, S. and L. Boreson, PI J.R. Galm, Short Report 534, Archaeological and Historical, Eastern Washington University

January – February 1998 - Environmental Assessment for the Upper Snake River Fish Culture Facility (includes wetland survey and survey for endangered plants)

**e. Methods**.

1) Operation of hatchery -

Task a. - Production of hatchery rainbows for release in enclosed reservoirs

- Assessment, Selection, and Collection of Broodstock

- Assess and inventory the status of redband trout in the Owyhee drainage through the sampling of suspected pure wild redband trout populations in the Owyhee drainage, and genetically analyze the samples. Non-lethal methods (tissue samples) will be used for stock identification when possible (i.e. genetic stock identification using intron analysis)
- Assess and inventory the status of Yellowstone cutthroat trout on the Fort Hall Reservation through the sampling of suspected pure wild Yellowstone cutthroat trout populations on the Fort Hall Reservation, and genetically analyze the samples. Non-lethal methods (tissue samples) will be used for stock identification when possible (i.e. genetic stock identification using intron analysis).
- Select phenotypes and collect gametes and/or adult wild fish to initiate broodstock. Gametes will be collected from adult fish collected at weirs. Random selection of spawners will be in direct proportion to natural populations. Sperm cryopreservation may be used.

- Hatchery broodstock or gametes will be replaced yearly at a rate of 20 to 30 percent.

## Task b. - Experimentation with holding of native broodstock in a hatchery setting

Project disinfection

- all gravel removed and ponds flushed and disinfected
- liners added to raceways, flushed, and disinfected with PVP iodine or chlorine mix

Raceways

- separate from domestic portions with fencing
- concrete with liners
- experiment with different food types and application of food types
- prevent disease transmission from adult broodstock (e.g. disinfection of nets, waders, etc.)
- experiment with artificial cover/substrate

Feed

- experimentation with alternative feed for maintenance of native broodstock
- low phosphorous medicated starter food (if necessary) and pellets for hatchery rainbows

Wastewater Treatment

- cleaning waste drained to a rotary drum
- remove collected filtered solids <30 microns
- collected solids pumped to storage area
- solids disposed of on or off site

Fish Health Management

- separation of domestic and native raceways and water supplies
- Separation of broodstock from fish and eggs (i.e terminal raceway)find proper raceway/pond loading density for broodstock and hatchery rainbows
- disinfection and cleaning of equipment with PVP iodine
- install drip applicators (e.g. formalin treatment) at heads of raceways for rapid response to outbreaks of BKD/Columnaris/IHN etc.

- minimization of handling stress
- monitoring of fish behavior (i.e. flashing), DO, temperature, and ammonia levels in water
- testing of new fish and eggs entering hatchery for disease and/or genetic health - on site fish health specialist or ship to IDFG
- monitor growth indices at all life stages using organosomatic index and K-factors then determine proper size at release

Genetic Management

- Random selection (broodstock collection mating)
- No pooling of milt
- Use spawners in direct proportion to population
- Rotational line crossing
- Sperm cryopreservation

## f. Facilities and equipment.

**New Hatchery Building**

A new hatchery building is estimated to require 2,900 sq.ft. (32' x 90') to provide for 28, eight-stack Heath-type incubators; sufficient incubation/early rearing raceways (six 3' x 12' x 2' fiberglass troughs, with space for six additional troughs) to meet program requirements; and service spaces**.** Construction of the new hatchery building would consist of a pre-engineered metal-frame building with a concrete slab on grade foundation. The slab or grade foundation would be designed based on load capacity of the existing soils. Water flow to the facility would be by gravity from artesian wells and springs. The wells and building would be located to take advantage of available slope on the site for gravity flow.

**New Feed and Hardware Storage Building**

A feed/hardware storage facility will provide food storage requirements; supply space for feed unloading operations; and space allocation for vehicles and other large equipment storage. This facility is currently planned to be a pre-engineered type building of metal-frame construction with concrete slab on a grade separated from the hatchery building. It is currently estimated that a total area of 750 sq.ft. is required for feed storage (300 sq. ft. for ten pallets) and feed handling (100 sq. ft.). An additional space of approximately 450 sq.ft. should be provided for vehicle storage and covered truck unloading. The total covered area is estimated at a minimum of 1,300 sq.ft. with a covered feed vehicle unloading area.

**New Raceways**

Twelve 800 cubic feet raceways are proposed (6' x 80' x 2.5', approximately 25 to 30 percent/total space of which is lost in influent and effluent plumbing). The raceways are

currently planned to be covered by fixed bird netting. However, the unit will be planned and designed for future addition of Quonset-type structures, if the husbandry of redband trout indicate better development in controlled lighting. Raceways will be constructed of concrete, fiberglass, or aluminum, depending on cost and durability factors.

**Hydraulic Head Boxes and Gas Transfer**

Three hydraulic head boxes will be used as flow splitters and hydraulic head control off each well. Groundwater will be passively treated to remove nitrogen and add oxygen. A pure oxygen-packed column or Michigan-type column will be used. The use of pure oxygen will reduce the nitrogen levels below 100 percent and supersaturate the water with oxygen. Because of seasonal differences in $O_2$ +$N_1$, the gas transfer system can be designed to operate with either pure oxygen or air.

**Liquid Oxygen Tank**

A source of pure oxygen will be needed for the aeration/degassing units. A medium pressure, vertical liquid oxygen tank (2,000 gal. to 3,000 gal.) with ambient vaporizers, and a fenced concrete pad will be needed. A two- or three-week supply of liquid oxygen (LOX) should be provided.

**Effluent Screening**

Screens are proposed for the removal of cleaning solids from the raceway water. These screens are currently proposed to be rotary drum screen filters with a spray backwash system. Solids collected from these screens would require collection and either removal to a local landfill, or incorporation into the Waste Treatment Facility with disposal on near-by Tribe-owned agricultural land. Effluent treatment ponds would be designed to provide a one-hour detention of the full flow of the facility. This would require a pond of 50’ x 50’ x 12’ (two-foot freeboard), which may be excessive for using gravity flow at this site.

**Wastewater Treatment Facility**

The extent and type of treatment of the hatchery effluent water necessary prior to discharge into McTucker Creek would be defined by the production of the facility. The current hatchery proposal would utilize off-line treatment of cleaning flow. Cleaning solids would be collected by a decant system off the raceway and separated by microscreening. Solids preferably would be disposed of on appropriate Tribal agricultural land. After treatment water flowing through the raceways would then be directly discharged into McTucker Creek.

**Access Roads**

A new access road will be required for the site. It is recommended that this road be constructed at least 24’ in width, and asphalt-surfaced. A secondary (gravel) access road system will be provided around the raceways. Soil conditions will require geotechnical investigation prior to design of all road and building systems.

**g. References**.

Dwyer W.P., and B.D. Rosenlund. 1988. Role of fish culture in the reestablishment of greenback cutthroat trout. American Fisheries Society 4: 75-80.

R.J. Stuber., B.D. Rosenlund, and J.R. Bennett 1988. Greenback cutthroat trout recovery program: management overview. American Fisheries Society Symposium 4: 71-74.

Thurow, R.F., C.E. Corsi, and V.K. Moore. 1988. Status, ecology, and management of Yellowstone cutthroat trout in the upper Snake River drainage, Idaho. American Fisheries Society Symposium 4: 25-36.

## Section 8. Relationships to other projects

This project is linked to the Shoshone Bannock habitat restoration/enhancement Fort Hall Reservation (# 9201000). Habitat restoration/enhancement and protection is aimed at providing conditions for self perpetuating populations of native Yellowstone cutthroat trout. The hatchery is needed to provide supplementation for stocks dwindling due to habitat loss and genetic introgression from hatchery rainbows. Selection of broodstock and source pools for wild gametes will require a comprehensive genetic inventory of existing Yellowstone cutthroat trout populations on the Fort Hall Reservation. The genetic inventory has been added to the habitat restoration budget for fiscal year 1999.

## Section 9. Key personnel

Three full time and two part time hatchery employees will be hired during construction phases of the project. Current obligations, including contracting of engineering/design, construction, and genetic inventory of Yellowstone cutthroat trout population will be handled by David C. Moser, Resident Fisheries Program Manager.

**David C. Moser**

**Education**

Bachelor of Science, Humboldt State University, 1989.
Major: Freshwater Fisheries
Major Advisor: Terry Roelofs, Ph.D.
Master of Science, Idaho State University, 1993.
Major: Aquatic Ecology
Major Advisor: G. Wayne Minshall, Ph.D.

**Experience**

Most recent experience:

Interim Resident Fisheries Biologist/Program Manager. Position in Resident Fisheries Program (RFP) responsible for soliciting, implementing, and maintaining Bonneville Power Administration and other contracts; planning biologically sound long-range fisheries restoration programs on and off the Fort Hall Reservation; assist in managing fishery resources, personnel, budgets, and equipment, under the RFP Coordinator. Membership in Columbia Basin Fish and Wildlife Authority Resident Fish Committee enables tribal cultural and biological concerns to be presented and addressed in a regional forum. Wrote and co-wrote annual reports for the BPA and BIA in 1997.

Fisheries Field Biologist for the Shoshone-Bannock Tribes. Responsible for implementation and maintenance of the resident fisheries program on the Fort Hall Indian Reservation. Duties included; supervision of field crews ranging from 5-20 technicians and Salmon Corps personnel.

**Projects Participated In**

1991-1993

Research assistant at the Idaho State University stream ecology center. Pocatello, ID.

1993-1994

The effect of flow regimes on primary and secondary production in Hawaiian streams. University of Hawaii and Department of Land and Natural Resources,

1996-1998

Resident Fisheries Biologist, Shoshone-Bannock Tribes, Fort Hall, ID.

**Publications and Presentations**

1995

Moser, D.C. and G.W. Minshall. 1996. Effects of Localized Disturbance on Macroinvertebrate Community Structure in relation to Mode of Colonization and Season. Am. Midl. Nat. 135:92-101.

1997

Moser, D.C. And C.G. Colter. 1997. Fort Hall Reservation Stream Enhancement: Shoshone-Bannock Tribes 1997 Annual Report to Bonneville Power Administration, Project 92-10, Portland, OR.

## Section 10. Information/technology transfer

Information/technology transfer will be provided through published annual reports, presentations at professional society meetings, and at least one publication in a peer reviewed journal.